

0855 Ablation of Porphyromonas gingivalis in vitro with Pulsed Dental Lasers

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Introduction: Both pulsed Nd:YAG (1064nm) and continuous diode (810nm) dental lasers are in current use for treatment of periodontitis. It has been shown that laser treatment kills pathogenic bacteria (laser antisepsis), but a quantitative method for determining clinical dosimetry does not exist.

Objective: The purpose of this study was to develop a method to quantify the efficacy of ablation of Porphyromonas gingivalis (Pg) in vitro for two different lasers.

Methods: The ablation thresholds for the two lasers were compared in the following manner. The energy density was measured as a function of distance from the output of the fiber-optic delivery system. Pg cultures were grown on blood agar plates under standard anaerobic conditions. Blood agar provides an approximation of gingival tissue for the wavelengths tested in having hemoglobin as a primary absorber. Single pulses of laser energy were delivered to Pg colonies and the energy density was increased until the appearance of a small plume was observed coincident with a laser pulse. The energy density at this point defines the ablation threshold.

Results: Ablation thresholds to a single pulse were determined for both Pg and for blood agar alone. The large difference in ablation thresholds between the pigmented pathogen and the host matrix for pulsed-Nd:YAG represented a significant therapeutic ratio and Pg was ablated without visible effect on the blood agar. At threshold the 810-nm diode laser destroyed both the pathogen and the gel.

Conclusion: Clinically, the pulsed Nd:YAG may selectively destroyed pigmented pathogens leaving the surrounding tissue intact. The 810-nm diode laser may not demonstrate this selectivity due to its greater absorption by hemoglobin.

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